

LA-UR-04-619

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*Title:* Ion irradiation of porous silicon: the role of surface states

*Author(s):* L.G. Jacobsohn, B.L. Bennett, D.W. Cooke, R.E. Muenchausen and M. Nastasi

*Submitted to:* Poster presentation at the 14th International Conference on Ion Beam Modification of Materials



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Form 836 (8/00)



# Ion irradiation of porous silicon: the role of surface states

L.G. Jacobsohn, B.L. Bennett, D.W. Cooke, R.E. Muenchausen and M. Nastasi

Los Alamos National Laboratory

**Si wafer:** *p*-type B-doped 3 $\Omega$ -cm

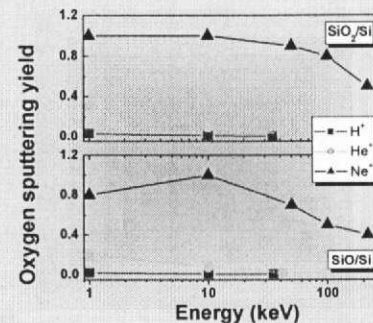
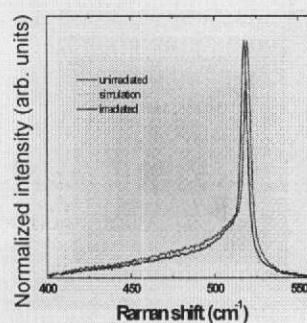
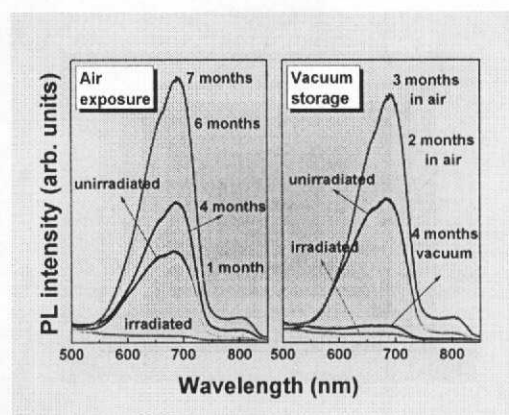
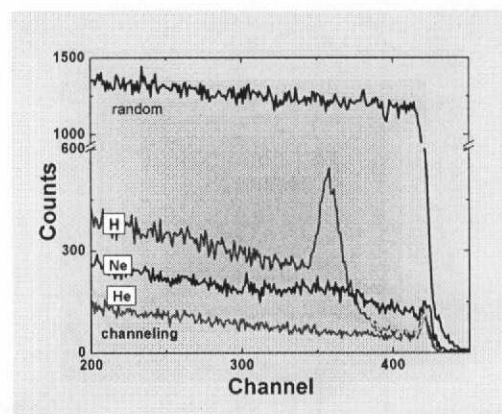
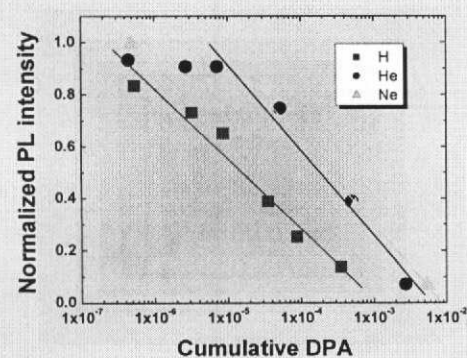
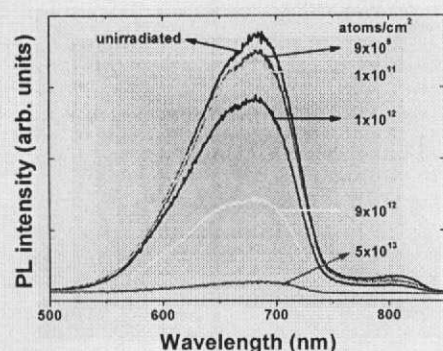
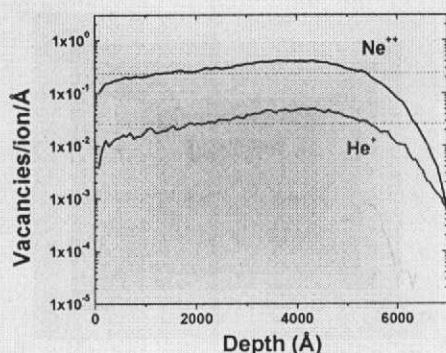
**Etching:** 0.33 mA/cm<sup>2</sup> for 6h in

1:1:2 HF:H<sub>2</sub>O:ethanol solution

**H<sup>+</sup>** 35 kV, **He<sup>+</sup>** 42 kV, **Ne<sup>++</sup>** 109 kV

**Range:** ~440 nm in c-Si

**Doses:** 1x10<sup>9</sup> – 7x10<sup>13</sup> atoms/cm<sup>2</sup>



## Summary & conclusions:

- Ion irradiation induces PL quenching from po-Si.
- Interaction of the implanted ions with defects generated during the irradiation process plays a major role in the PL quenching mechanism.
- Quenching was associated with the creation of nonradiative states within the gap.
- Exposition to air and consequently the oxidation of the surface is shown to enhance PL emission efficiency.